**[0026]** As described above, the displacement device **130** of the second preferred embodiment functions to manipulate the volumes of fluid within the first and second level fluid vessels **127** and **227** to deform a particular region **113** of the surface to a first and second stage. In a first variation of the second preferred embodiment, the second stage of deformation may be different from the first stage of deformation in height; for example, the height of deformation is higher relative to the surface **115** in the second stage than in the first stage, as shown in FIGS. **3-6**. In a second variation, as shown in FIG. **7**, the width of the deformation is also different in the second stage; in particular, the width is wider in the second stage than in the first stage. Here, the second stage of deformation may be thought of as merging the individual expansions of the first stage of deformation, thus bridging the gap between two individually deformed particular regions of the surface **113**. However, the second stage of deformation may be different from the first stage of deformation in any other suitable way. The displacement device may expand the first level cavity **125** (or any other suitable portion of the first level fluid vessel **127**) first to achieve a first stage of deformation in the particular region **113** and then expand the second level cavity **225** (or any other suitable portion of the second level fluid vessel **227**) to achieve a second stage of deformation of the particular region **113**, but may alternatively expand the first level cavity **125** first to achieve the first stage of deformation and then expand the second level cavity **125** to achieve the second stage of deformation, as shown in FIGS. **4***b*, **4***c* and **7**. Additional variation of deformation may be achieved by varying the volume of fluid that is displaced to the first and second level cavities **125** and **225** by the displacement device **130**. However, any other suitable sequence of expansion may be used.

**[0027]** As shown in FIGS. **4***a*-**4***c*, in the first variation of the second preferred embodiment as applied to the first variation of the sheet **102**, the second level cavity **225** may be expanded to provide a first stage of deformation to the particular region **113**. The expansion of the second level cavity **225** preferably deforms the substrate **120** internally, and the deformation of the substrate **120** preferably translates into a deformation of the bottom of the first level cavity **125** (shown in FIG. **4***b*). The volume of fluid contained within the first level cavity **125** is preferably substantially incompressible and of a constant volume, allowing deformation of the bottom of the first level cavity **125** to cause deformation of the layer **110** and deforming the particular region of the surface **113**. The cumulative pressure necessary to deform the substrate **120** internally as well as deform the layer **110** (more specifically, the particular region **113**) is preferably less than the pressure necessary to deform the bottom of the second level cavity **225** to allow the expansion of the second level cavity **225** to deform the particular region **113** and not to deform the bottom of the second level cavity **225**. Additionally, the pressure necessary to deform the substrate **120** internally is preferably higher than the pressure provided by a user during use of the user interface system **100** to provide a surface **115** that feels flat to the user unless a cavity **125**/**225** is deformed. To achieve the second stage of deformation of the particular region **113**, the first level cavity **125** is preferably expanded, providing additional deformation of the particular region **113** (shown in FIG. **4***c*). Similar to the pressure balance with regard to the expansion of the second level cavity **225**, the pressure necessary to further deform the particular region **113** is preferably less than the cumulative pressure necessary to deform the bottom of the first level cavity **125**, the substrate **120** internally, and the bottom of the second level cavity **225** to allow the expansion of the first level cavity **125** to further deform the particular region **113** and not to deform the bottom of the first level cavity **125**. Alternatively, the first level fluid cavity **125** may be deformed to achieve the first stage of deformation and the second level fluid cavity **225** may be deformed to achieve the second stage of deformation. However, any other sequence in the first and second stage deformation may be used.

**[0028]** As shown in FIGS. **7***a*-**7***d*, in the second variation of the second preferred embodiment as applied to the fourth variation of the sheet **102**, the second level cavity **225** may be expanded to deform both the first and second layers **110** and **210** to achieve the first stage of deformation. To achieve the second stage of deformation of the particular region **113**, the first level cavity **125** is preferably expanded, providing additional deformation of the particular region **113**. In the variation as shown in FIG. **7***c*, the additional deformation of the particular regions **113** results in a larger deformation of a particular region **113***a*. Similar to the pressure balance as described above, the pressure necessary to further deform the particular region **113***a* is preferably less than the cumulative pressure necessary to deform the bottom of the first level cavity **125** (in other words, the second layer **110**) and the bottom of the second level cavity **225** to allow the expansion of the first level cavity to further deform the particular region **113***a* and not to deform the bottom of the first level cavity **125**.

**[0029]** The second level fluid vessel **227** may be arranged substantially underneath the first level fluid vessel **127**. In this variation, the distance in height along the sheet **102** between the top of the second level fluid vessel **227** and the bottom of the first level fluid vessel **127** is preferably determined by the desired pressure necessary to deform the particular region **113** to the first stage by the expansion of the second level fluid vessel **227** and the desired resistance to deformation from the expansion of the first level fluid vessel **127** to achieve the second stage of deformation. However, the distance in height may be determined using any other suitable means.

**[0030]** As shown in FIGS. **3-6**, the number of deformable portions of the first level fluid vessel **127** (for example, first level cavities **125**) is preferably equal to the number of deformable portions of the second level fluid vessel **227** (for example, second level cavities **225**). More specifically, there is preferably one second level cavity **225** that is substantially adjacent (for example, directly above or diagonally above) to each first level cavity **125**. However, as shown in FIGS. **7** and **8**, the number of first and second level cavities **125** and **225** may be different. For example, as shown in FIGS. **7***a*-**7***c*, there may be two second level cavities **225** for each first level cavity **125**. As shown in FIG. **7***b*, as each of the second level cavities **225** is expanded, the corresponding particular regions **113** are deformed, achieving a first stage of deformation. The first level cavity **125** is then expanded to achieve a second level of deformation of a larger particular region **113***a*. In the variation as shown in FIG. **7**, the second level cavities **225** are preferably placed symmetrically relative to the first level cavity **125**, and both second level cavities **225** are preferably expanded prior to the expansion of the first level cavity **125** to achieve a substantially level second stage deformation of the particular region **113***a*. Alternatively, only one of the second level cavities **225** may be expanded prior to expansion of the first level cavity **125** if a non-level deformation of the particular region **113***a* is desired. Yet alternatively, only the first level cavity **125** may be expanded. However, any other suitable